

Next, according to a method and apparatus for mounting an electronic component of, for example, an IC chip on a circuit board and an electronic component unit or module of, for example, a semiconductor device in which the IC chip is mounted on the board by the mounting method, according to a twenty-eighth embodiment of the present invention, based on each of the aforementioned embodiments, it is acceptable to provide the inorganic filler 6f to be mixed with the insulating resin 306m by at least two types of inorganic fillers 6f-1 and 6f-2, which have a plurality of different mean particle diameters, and make one inorganic filler 6f-1 of the larger mean particle diameter out of at least two types of inorganic fillers softer than the epoxy resin of the insulating resin 306m, producing a stress alleviating effect by the compression of the one inorganic filler 6f-1.

According to this twenty-eighth embodiment, the stress alleviating effect can be produced in addition to the operative effect of the twenty-fourth embodiment by virtue of the arrangement that the one inorganic filler 6f-1 of the larger mean particle diameter is made of the material identical to that of the insulating resin 306m and the arrangement that the one inorganic filler 6f-1 of the larger mean particle diameter is softer than the epoxy resin of the insulating resin 306m, as a consequence of

which the one inorganic filler 6f-1 is compressed as shown in Fig. 62 to disperse the tension force of a reactive force against the compression around there when a stress is exerted on the insulating resin 306m.

5 (Twenty-Ninth Embodiment)

Next, according to a method and apparatus for mounting an electronic component of, for example, an IC chip on a circuit board and an electronic component unit or module of, for example, a semiconductor device in which the
10 IC chip is mounted on the board by the mounting method, according to a twenty-ninth embodiment of the present invention, based on each of the aforementioned embodiments, it is further acceptable to mix a portion 700 or a layer 6x, which belongs to the insulating resin layers 6 and 306b and
15 is brought in contact with the IC chip 1 or the board 4, with a smaller amount of inorganic filler than another portion 701 or a layer 6y or with no inorganic filler 6f, as shown in Figs. 63A and 63B, Figs. 64A and 64B, Fig. 65 and Fig. 66. In this case, it is acceptable to gradually
20 vary the amount of inorganic filler without definitely distinguishing the portion 700 brought in contact with the IC chip 1 or the board 4 from the other portion 701 as shown in Fig. 63A and 63B or to definitely distinguish them from each other as shown in Figs. 64A and 64B, Fig. 65 and
25 Fig. 66. That is, in Figs. 64A and 64B, Fig. 65 and Fig.

66, the insulating resin layers 6 and 306b are allowed to have a multilayer structure provided with a first resin layer 6x that is positioned in the portion brought in contact with the IC chip 1 or the board 4 and in which an
5 insulating resin identical to the insulating resin 306m is mixed with the inorganic filler 6f as well as a second resin layer 6y brought in contact with the first resin layer 6x and constructed of the insulating resin mixed with a smaller amount of inorganic filler than the first resin
10 layer 6x or with no inorganic filler 6f.

With this arrangement, the following effects can be produced. That is, if the inorganic filler 6f is mixed by the same weight percentage (wt%) with the whole body of the insulating resin layer, then the inorganic filler 6f
15 might increase on the IC chip side or the board side or in the vicinity of the opposite surfaces of both of them and conversely decreases in a portion located in the middle of the IC chip 1 and the board 4. As a result, there is a greater amount of inorganic filler 6f on the IC chip side
20 or the board side or in the vicinity of the opposite surfaces of both of them, and therefore, the adhesive strength is sometimes reduced between the insulating resin layers 6 and 306b and the IC chip 1 or the board 4 or both of them. According to the twenty-ninth embodiment, with
25 the arrangement that the portion 700 or the layer 6x